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INTELLIGENCE BRIEF

THE SOVIET USE OF SPACE-RELATED TECHNOLOGY IN THE CIVILIAN ECONOMY

DIRECTORATE OF INTELLIGENCE
Office of Research and Reports

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THE SOVIET USE OF SPACE-RELATED TECHNOLOGY IN THE CIVILIAN ECONOMY*

Summary

An editorial in Pravda Ukrainy of 28 December 1965 featured a statement that the Soviet space program has yielded "benefits to mankind." Specifically, the editorial attempted to defend the value of the space program to the Soviet public on the grounds of the following developments which are claimed to have been brought about by "Sputnik": long-distance television transmission, special metal alloys, miniature electronics, rocket fuel, weather forecasting, and medical telemetry. Some Soviet technological developments in the military and civilian space field probably have found their way into the economy, but none has as yet yielded direct benefits to the Soviet consumer. This situation contrasts with the US experience, where important technologies developed for the space effort have been introduced effectively in the market place. There are several reasons for the failure of "space spin-off" to develop more rapidly in the USSR. The Soviet space program has tended to utilize existing world and Soviet technology rather than to rely on pioneering. Furthermore, in those instances where the Soviet research has been unique, it has apparently been held rather closely within the confines of the military establishment. Finally, the Soviet managerial system has been lax in seeking out and applying new techniques of value, and the typical plant manager generally treats opportunities to introduce new products as disruptive and annoying diversions from his current production plan. These factors are especially true in the civilian consumer goods sector, where most technology is 10 or 20 years behind that readily available in the West.

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* The estimates and conclusions in this brief represent the best judgment of this Office as of 17 January 1966.

1. Evidence of Spin-Off

In a review of recent Soviet products embodying advanced technology or new scientific concepts, one is faced with the difficulty of separating those which have stemmed solely from Soviet space advances from those which have in part ridden the coattails of world technological developments or came from Soviet work in other priority areas such as nuclear systems. Furthermore, direct information on the subject is virtually nonexistent. Given all these qualifications, however, it seems reasonable to suppose that some Soviet research programs undertaken to meet the projected requirements for the space program have stimulated the development of technology that should be of value to the civilian economy.

The development of several industrial materials, for example, may have been accelerated -- though not necessarily initiated -- because of their potential for use in the space program. In the chemical industry, fluorocarbon products of potential value to the Soviet space effort are used as corrosion-resistant materials in various types of chemical equipment. Epoxy and silicone resins used in the manufacture of electrical components have a potential for space application as well as in industrial installations.

Similarly, in the field of metallurgy the effort to develop high-strength, heat-resistant, and corrosion-resistant materials for space may be beneficial in the development of materials suitable for more conventional civilian applications. Titanium and titanium alloys of possible space use, for example, are being used in fabricating Soviet chemical plant equipment, and some progress also has been made in the use of these materials in ship construction.

In the area of public services -- transportation, communications, and the like -- there are even fewer concrete examples to draw on. The USSR has made use of some types of plastic, developed in part for the military, to produce railroad equipment; epoxy glues, developed through world space research, are being used in automotive repairs, although in a restricted manner not much beyond the experimental stage.

In telecommunications, the civilian sector has not yet fully absorbed the technology developed years before Sputnik I, and the space-associated advances in data transmission, telemetry, and solid-state technology have

yet to make their contribution. The successful launching of the Soviet communications satellites ostensibly presents an exception to the general lack of interplay between the development of civilian and space military communications. In fact, the value of sophisticated space communications techniques is greatly limited by the inadequate communications facilities on the ground. Thus, past neglect of civilian telecommunications greatly diminishes the impact that this program might otherwise have on services provided both to economic enterprises and to the general public.

The scarcity of examples of application of newly acquired advanced technology is even more pronounced in the consumer goods industry. In fact, a search of Soviet press and technical journals reveals nothing to suggest that the Soviet people are reaping any benefits in new or improved consumer goods stemming from Soviet space R&D. In one area -- the electronics industry -- many transistor radios are produced for civilian use but from components that are surplus or those that do not meet space and military specifications -- hardly a bona fide example of technological spin-off. As another example of spin-off that is more apparent than real, certain Soviet specialty stores which cater to holders of foreign exchange recently offered limited numbers of miniature radio receivers with outside dimensions as small as one and one-half inches on a side and obviously incorporating integrated circuit devices, perhaps similar to those used in electronic devices for space and military purposes. There is no evidence, however, that radios of this type have actually been made available to the Soviet general public, and their existence may be explained as a "stunt" to demonstrate Soviet technological competence.

2. Reasons for Lack of Spin-Off

There are probably several reasons for lack of transfer to the civilian economy of R&D from the space industry. For one thing the Soviet industrial and military bureaucracy is highly compartmentalized, and innovations in one field do not readily find their way into another -- a situation which Soviet leaders have denounced rather constantly in recent years. This lack of coordination and exchange in the system results partly from the shroud of secrecy which surrounds the Soviet military effort -- but it also stems from the lack of incentives at the factory level to encourage ingenuity in the introduction of new products. Studies on the spin-off of US space technology discuss numerous individual and institutional barriers -- for example, reluctance to change, uncertainty and risk, and government restrictions -- but these impediments probably are small compared with the massive lethargy and resistance to change and innovation present in the Soviet system.

Furthermore, the underlying philosophy of the Soviet space program has diminished the likelihood of technological spin-off. Where possible, the program has apparently made use of existing technology -- both domestic and foreign -- rather than undertaking independent developments. In such a situation the opportunities for technological transfer have apparently been minimal. As an illustration of this view, the USSR did not initially develop subminiature electronic gear for its space vehicles, partly because it had boosters of sufficient size to orbit fairly large payloads. Although the USSR has now made some headway in this field (the subminiaturization of electronics in general), its efforts are well behind those of the United States.

The responsibility for expediting transfers to the civilian economy of technology developed in space R&D evidently rests with the State Committee for Science and Technology (formerly the State Committee for the Coordination of Scientific Research). Likewise, the Moscow-based ministries in charge of individual branches of the economy are probably also increasingly attuned to the need for creative use of military R&D in civilian programs.

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